TUNNEL.

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Thames Tunnel Co.

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SKETCHES

OF THE

WORKS

FOR THE

TUNNEL UNDER THE THAMES

FROM

ROTHERHITHE TO WAPPING.

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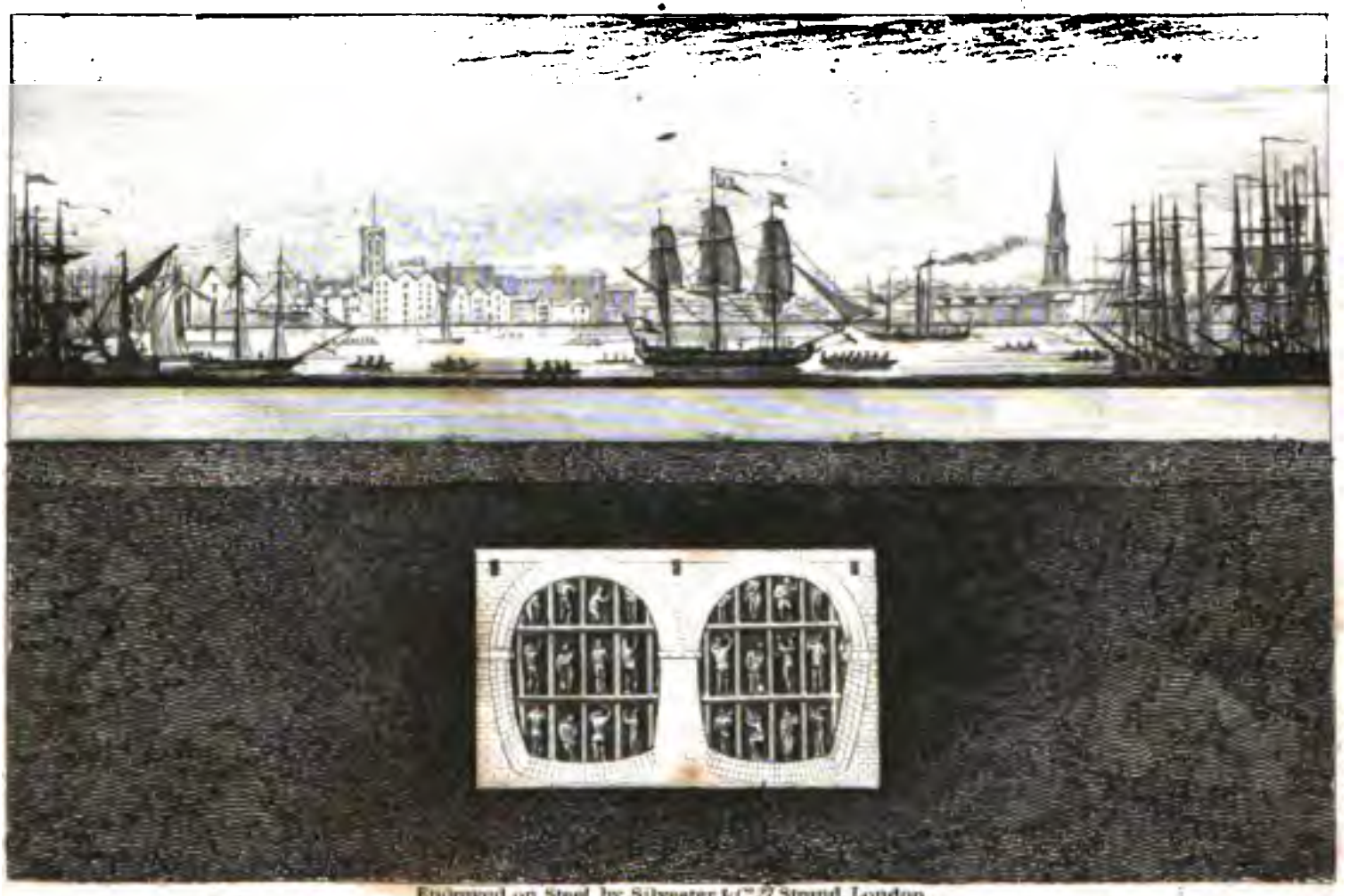

Engraved on Steel by Silvester & C.° 22 Strand, London.

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INTRODUCTION TO THE SKETCHES.

THE attempts at Tunnels projected under the River Thames, one at Gravesend in 1799, the other from Rotherhithe to Limehouse in 1809, were soon abandoned. The undertaking to which this collection of Sketches relates, was projected by M. I. BRUNEL, Esq. C.E. F.R.S. whose works for Government have been equally creditable to his scientific abilities, and to his personal character.

The THAMES TUNNEL COMPANY having been incorporated by Act of Parliament, the work was begun in 1825, by sinking a shaft or tower of considerable magnitude, for the purpose of preventing the influx of water from the land springs with which the soil abounds. At the bottom of this shaft a lateral excavation was made for commencing the Tunnel, and from thence the constant protection and support of the soil (with the great weight of water upon it) was effected by means

of a strong iron frame of Mr. Brunel's invention, which being pressed forward gradually with the progress of the excavation, was immediately followed up by very substantial brickwork, the dimensions of which will be found in this collection.

The situation fixed upon for this important undertaking is perhaps the only one between London Bridge and Greenwich where it could be attempted, without interfering essentially with the great public establishments on either side of the river: it is about two miles below London Bridge, in a very populous and highly commercial neighbourhood, where a facility of land communication between the two shores is very desirable, and where a successful issue must be very advantageous to the adjacent counties as well as to the immediate neighbourhood.

The river is 1000 feet wide where the Tunnel has been begun, and the whole length of the Tunnel from shaft to shaft will be 1300 feet; of which, 600 feet have been effected in the most substantial manner,

having cost, with the shaft, only £126,000, exclusive of machinery. The works were continued 50 feet after the first influx of the river in 1827, and the full occupation of the shield has been resumed since the second irruption in January 1828, but the finances of the Company not being sufficient to proceed with certainty of being able to continue the work to a successful issue, it has been judged necessary to brick up effectually the shield and the arches at the end of the work, to prevent any damage, and the Tunnel may now be viewed in its full extent.

The practicability of a carriage road under a navigable river being established by the work already done under the river Thames, from Rotherhithe towards Wapping, it is to be hoped, that means may be found to complete this important work, which the public voice considers as an undertaking of national interest; with this view the bricking up the shield has

been effected in a way to be able to resume the operations from Rotherhithe, unless it should be thought preferable to work from the Wapping side of the river.

The vignette, which follows the title page, is a view of Wapping, with the churches of Shadwell and St. George's in the East at a distance, and a transverse section of the Tunnel, with a view of the workmen in the different cells of the shield.

The first print in the collection is a view of the western archway of the Tunnel, lighted by gas, as it now appears: the other sketches or plans have each such explanations, as it is hoped will give sufficient information upon the objects which are there represented.

August 1829.

The annexed plan will shew the situation of the Tunnel with regard to the main roads leading to it.

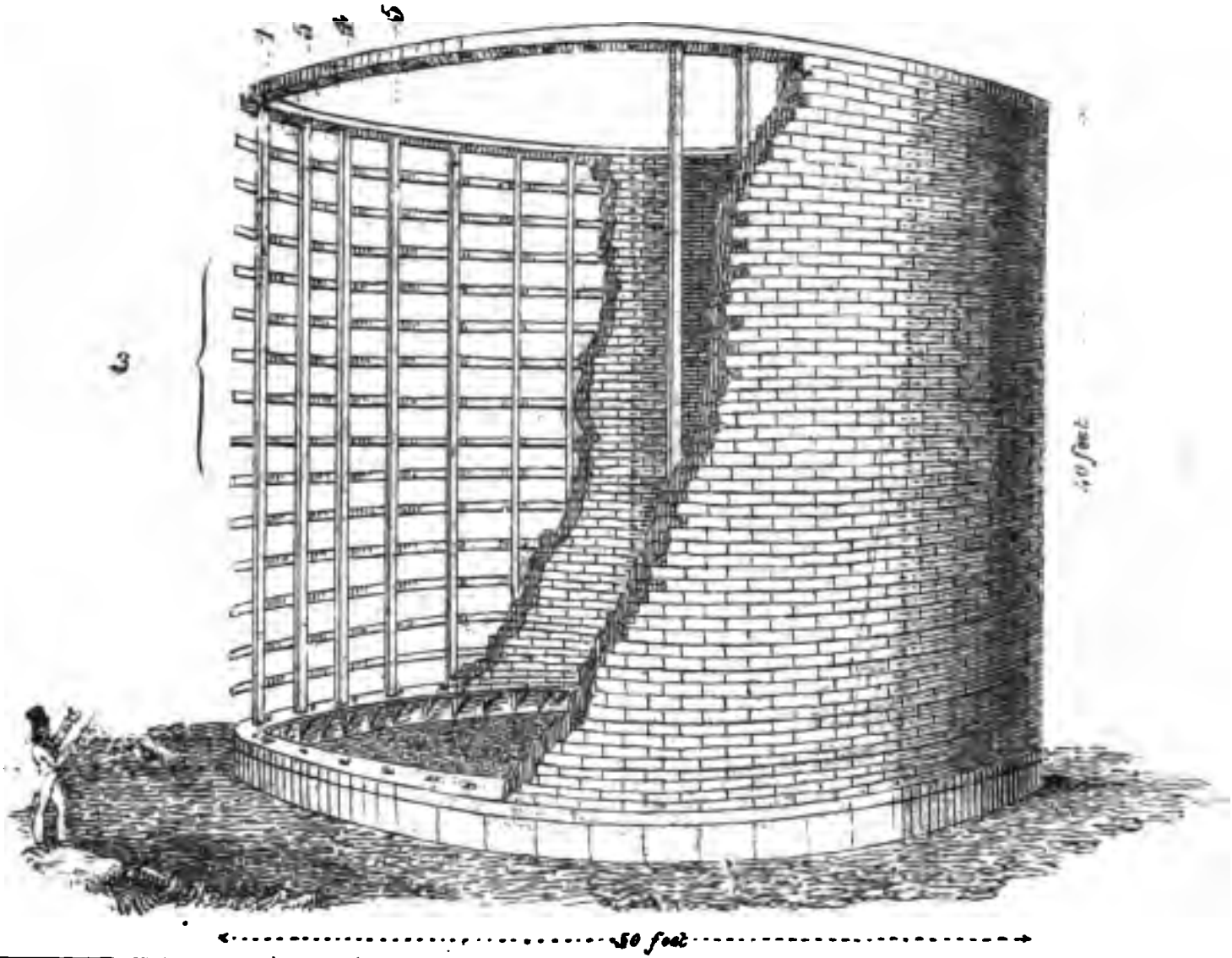
The distance from

London Bridge along Tooley Street, is	2 miles.
The Great Kent Road	1½
Greenwich Church by Deptford Creek	2¼
Mile End Turnpike	1¼
The Bank of England	2

The numerous commercial establishments, and the large population in the immediate neighbourhood of both shores requiring a near access to the Tunnel, it is intended to make the carriage descents circular, and they will not in any part exceed the slope of Ludgate Hill, or Waterloo Place in Pall Mall

The shaft from whence the excavation of the Tunnel and the works are carried on, was built in the yard originally as a tower of brickwork three feet thick, and sunk into its position by excavating the earth within; the annexed sketch is given as a disjointed piece of brickwork, and the numbers below will tend to explain the construction of that tower, which now forms the lining of the shaft, and which is intended finally for the descent of foot passengers.

1. 1. The wooden rings or flat curbs.
   2. The iron curb.
   3. Hoops or laths binding together the uprights.
4. 4. Iron rods in a wooden box, } screwed tight to the top and the bottom
5. 5. Wood - - - - - - - } curb.

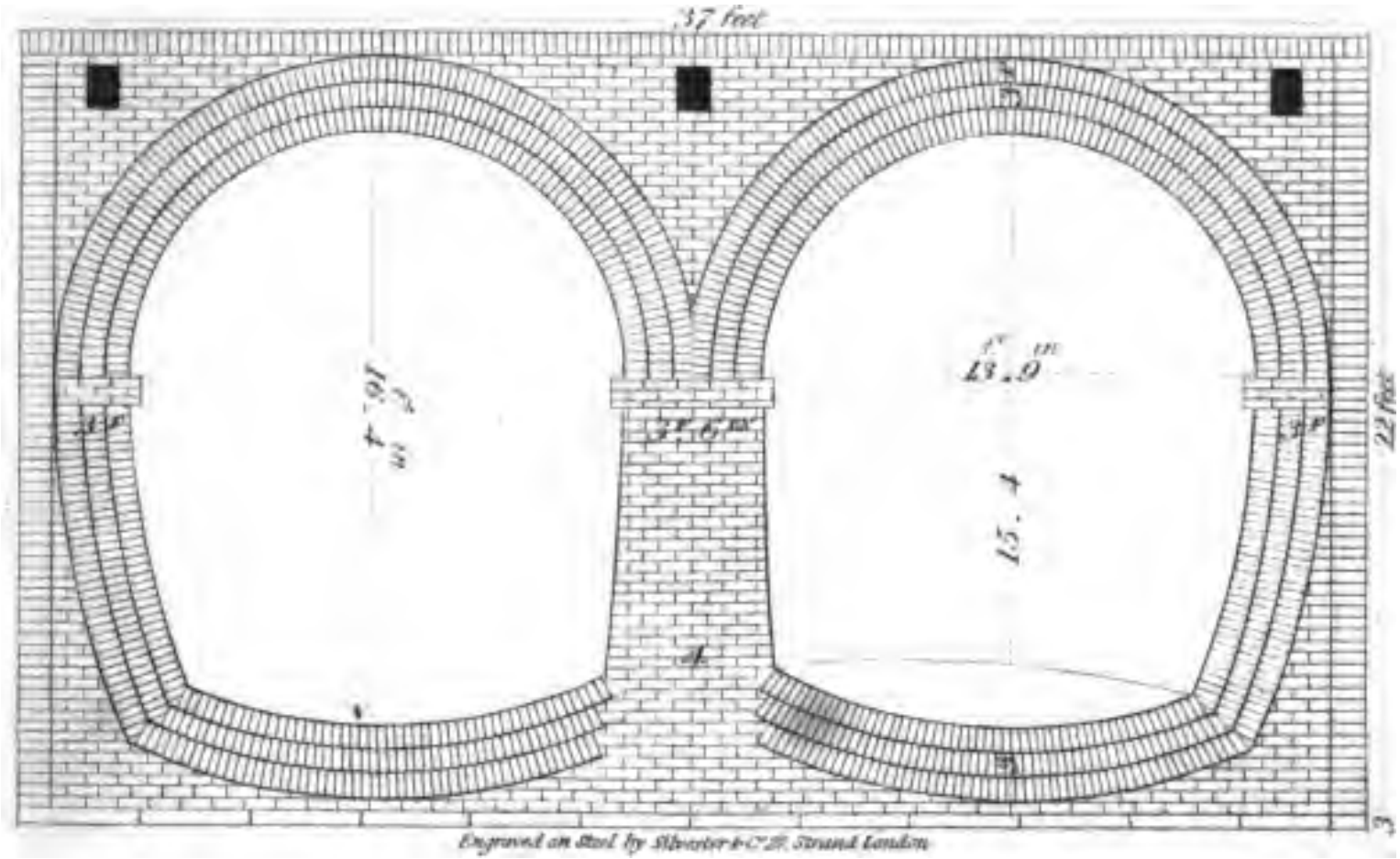


Engelmann & Co. Lithog.

This transverse section of the Tunnel shews the dimensions of the structure, and the way the brick-work is put together.

For the convenience, lightness, and beauty of the work when complete, the middle wall is open in a succession of arches,—thus forming an arcade between the two archways.

It must be observed, that the middle wall is, for greater security, built quite solid: the arches are afterwards cut open from the solid, as through a rock.



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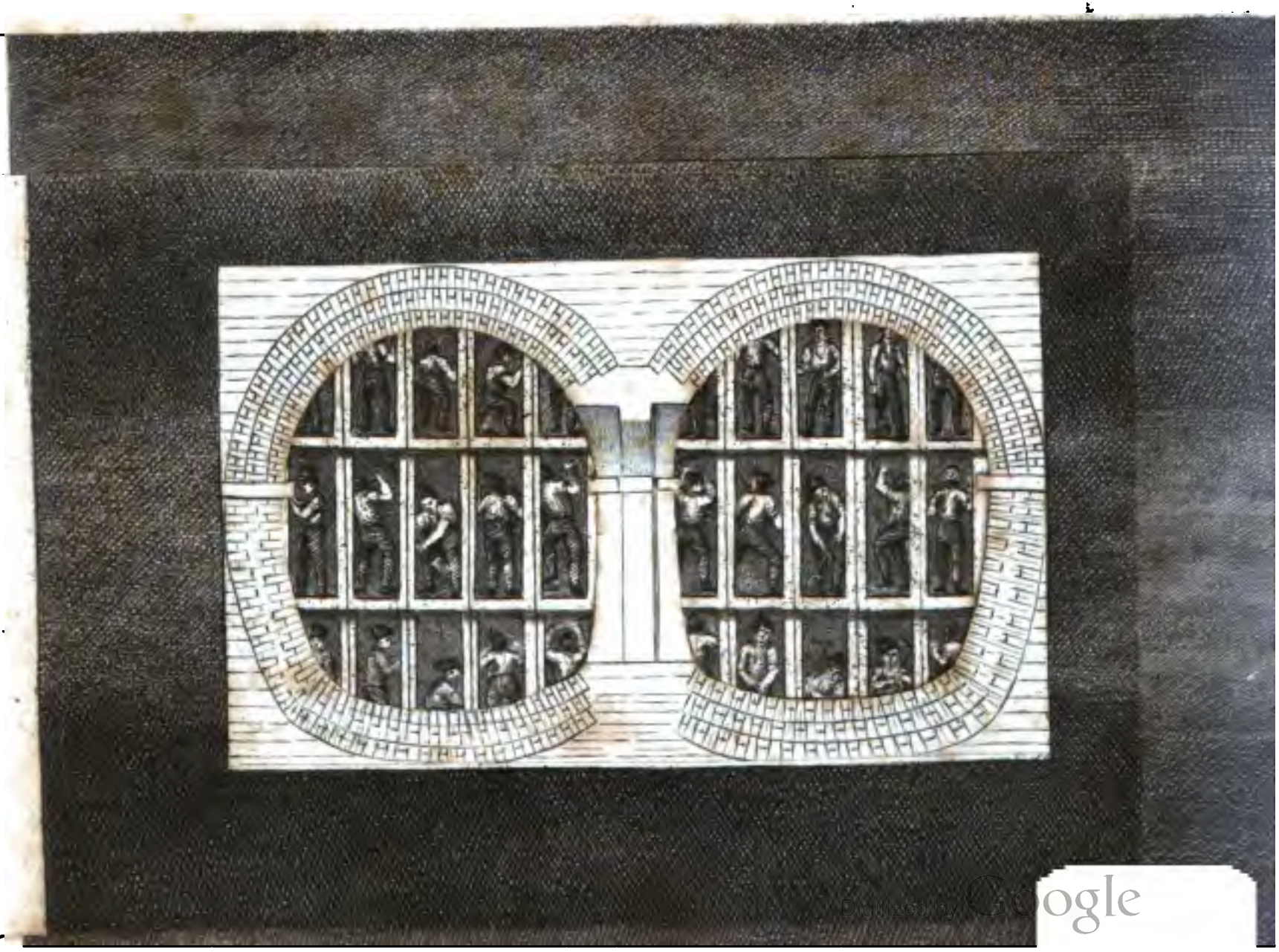
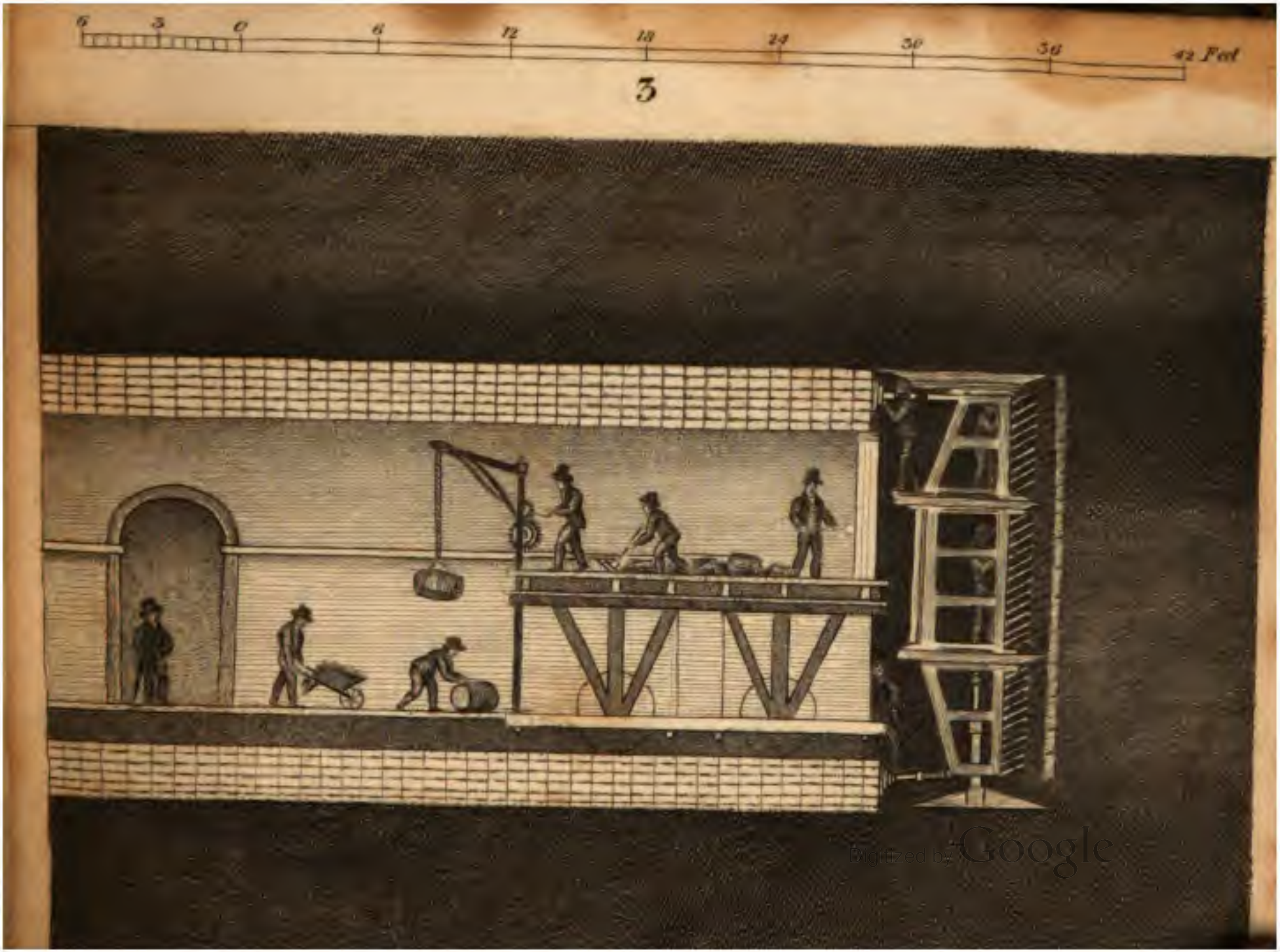
This view shews a portion of the workmen in the iron shield, as they were seen along the archways, which are represented by a transverse section of the brickwork of the Tunnel.

The front of the excavation under the river, which is 37 feet wide by 22 feet high, is covered by the iron shield, weighing 120 tons, and consists of 12 divisions, which are advanced alternately and independently of one another, having each, three cells or floors, which serve constantly as a scaffold for the miners and bricklayers, as may be seen by the following longitudinal section of the work.



A longitudinal section of about 40 feet of the Tunnel, with a side view of the shield, and the miners as well as the bricklayers at work. This sketch represents the moving stage, upon both floors of which the soil is thrown by the miners for removal, and the bricks, cement, and sand, are placed in readiness for carrying on the work. Towards the head and foot of the shield, is also shewn the position of the horizontal screws, which butting against the brickwork, are used to push forward the several divisions.



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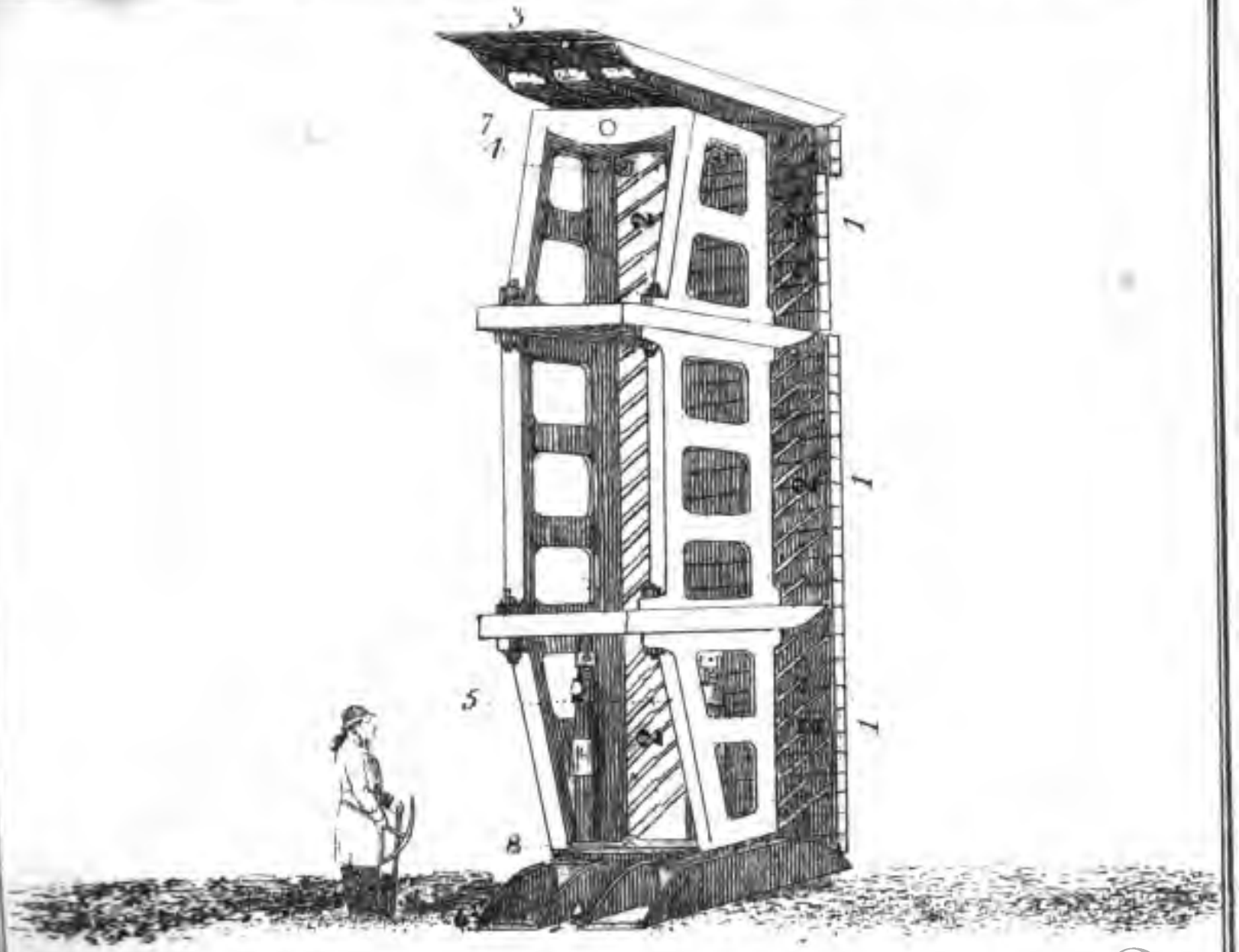
One of the divisions of the shield, which are advanced separately and independently of each other, by the means pointed out in the foregoing sketch: each has boards in front (known by the technical name of polling boards) No. 1. which are supported and kept in position by means of jack screws No. 2. lodged against the iron frame, and which being in succession taken down while the earth in front is excavated, but immediately replaced, they become a constant firm buttress, as is attempted to be exhibited in the annexed design, which may be further understood by reference to the following numbers.

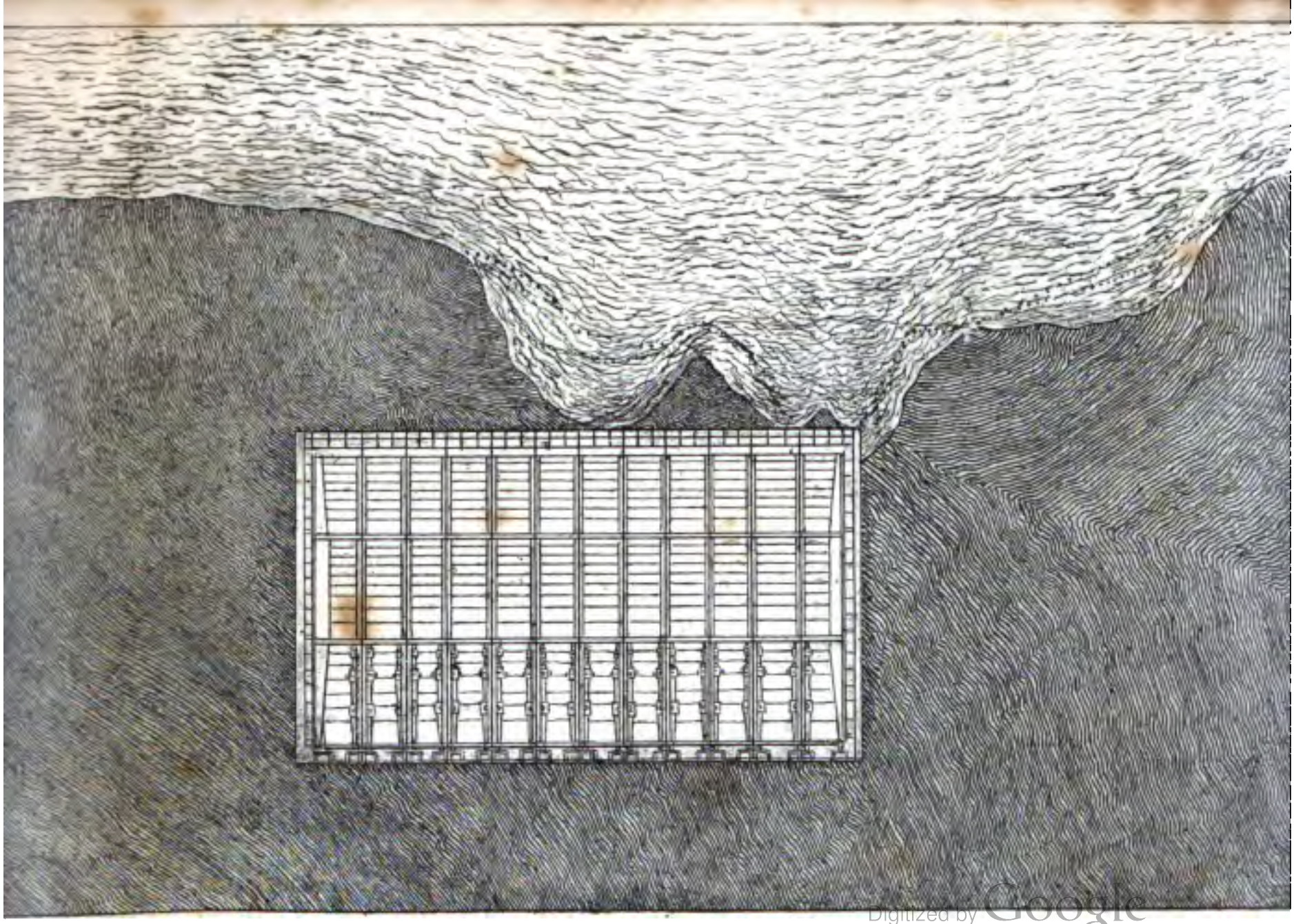
3. The top staves covering the whole top of the excavation.
4. Screws to raise or depress the top staves.
5. The legs, being jack screws fixed by ball joints to the shoes 6, upon which the whole division stands.
7 & 8. The sockets where the top and bottom horizontal screws are fixed to force the division forward.



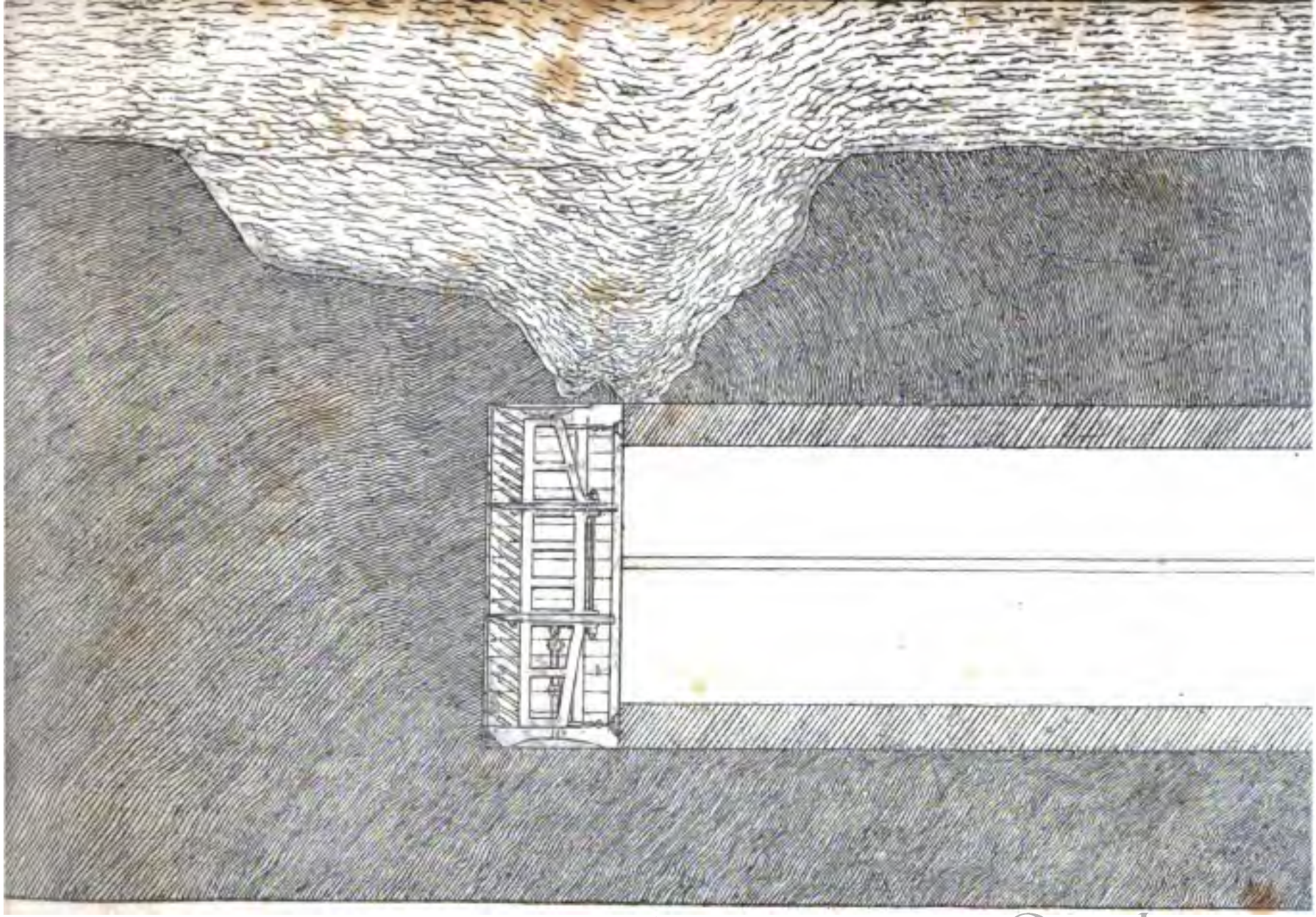
This longitudinal section of the Tunnel shews the progress of the work to the extent of 600 feet from the shaft at Rotherhithe towards Wapping. The inclination of the Tunnel has been made to vary from 3 to 1½ per cent. making in all 13 feet.

The top of the excavation is intended to be never less than 14 feet from the bed of the river, the depth of which is likewise laid down in the section from actual measurement.

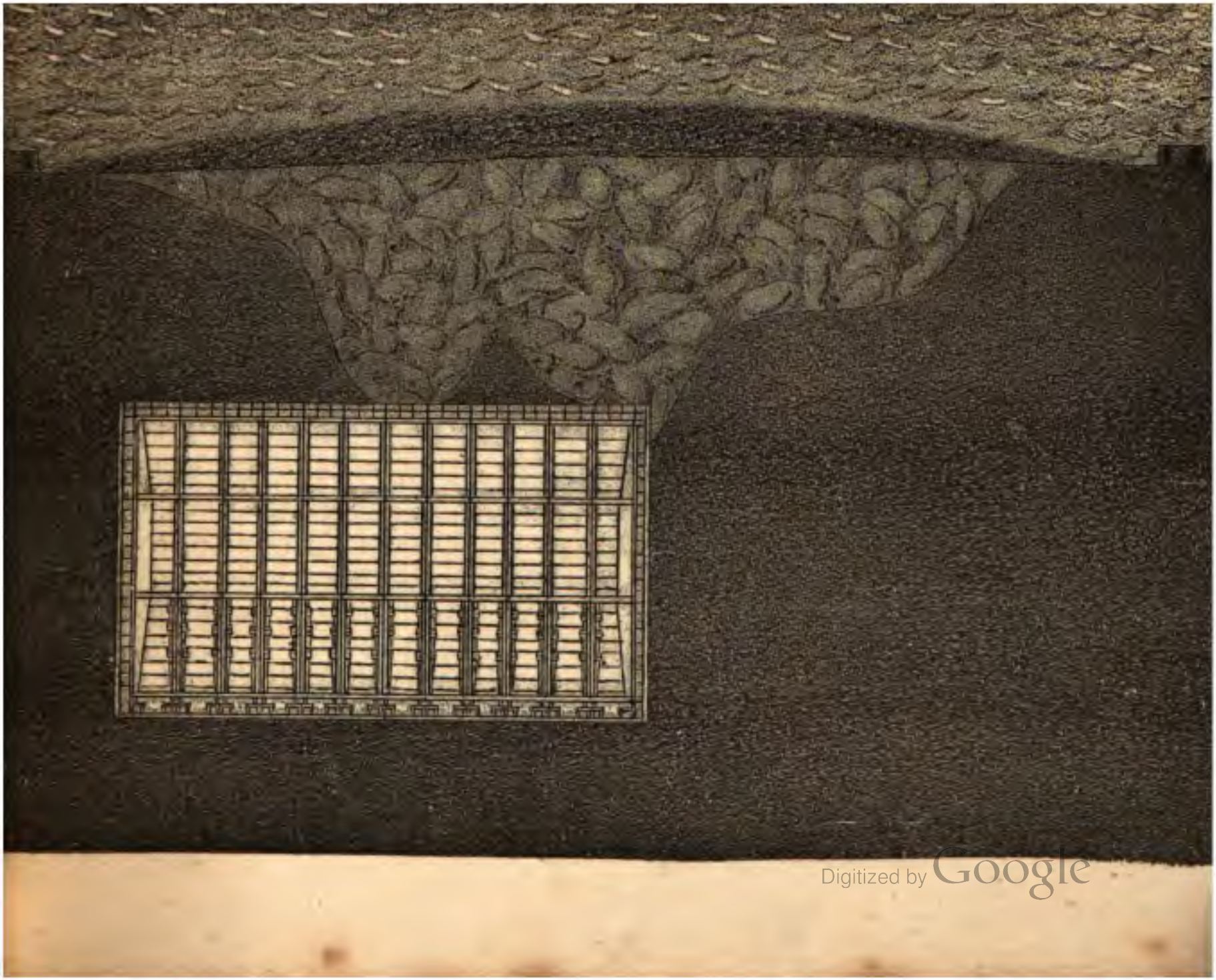
The dotted line in this transverse section of the river at the extremity of the works, shews the state of the bed of the river as it was found immediately after the accident of the 18th May, 1827, and the view of the shield shews the situation where the loose materials and soil (which had accumulated in a cavity in the bed of the river) fell into the Tunnel by an opening of 5 feet by 2 feet 6 inches, and the water rushing in filled the whole of the works. That large cavity having been nearly filled with bags of clay, the ground in another part, which for some time had been observed to be in a very loose state, gave way, and it seems that nearly the whole of the soil (to the extent of 20 feet) which remained upon the shield after the first irruption, was dispersed by the ebb and flow of the tide, and the top of the shield was then covered by bags of clay to that extent, forming a solid mass impenetrable by the river.



This longitudinal section of the works for the Tunnel exhibits a side view of the shield, with a section of the cavity formed by the irruption into the Tunnel; this section, with that which precedes it, will give an idea of the extent of the cavity, which may be considered as square, being about 50 feet each way, tapering downwards to a very irregular, but a very large hole from the river to the top of the shield, to the extent of about 20 feet in length by 12 feet wide. The cavity was filled up by bags of clay, with gravel intermixed, lying upon the top of the shield, forming thus a newly made bed to the river, the superficial extent of which may be observed by the following section, which shews the repair of the accident. It is estimated that about 1000 cart loads of loose soil and rubbish (equal to 1000 tons) had descended into the Tunnel, completely emptying the cavity of its loose materials, but leaving the original bed of the river undisturbed.



This section of the river, at the extremity of the works where the Thames broke in on the 18th May, 1827, (carrying with it the contents of a large dredging hole,) will shew the manner in which the very large cavity which was made by the irruptions into the Tunnel was filled up by bags of clay, resting upon the iron shield, and forming thus a new bed to the river. The bags of clay were covered with gravel, and then guarded by a thick tarpauling, kept down by cast iron kintledge, and a covering of gravel to keep the whole as close as possible, while the clay settled upon the top of the shield. The cavity formed by the irruption of January, 1828, was filled up by bags of clay, intermixed with gravel, as upon the former occasion, but experience has proved that the covering of tarpauling is not wanted.



A transverse section of the Thames, with a section of the shafts for foot passengers, and a longitudinal section of the Tunnel, with the openings intended to afford a free communication from one archway to the other.

The width of the River being 1000 feet from wharf to wharf. the Tunnel will be about 1300 feet from shaft to shaft.